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# The investigation of the time characteristic of local polar inhomogeneities in paraelectric phase in relaxors and ferroelectric crystals: on the example of $Sr_xBa_{1-x}Nb_2O_6$ crystals with different chemical composition

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Local polar inhomogeneities arising in the paraelectric phase in certain temperature range are a unique feature of relaxors and some ferroelectrics. Dynamic of these inhomogeneities are different in relaxor and ferroelectric crystals. It is known that these regions effect on temperature behavior of a central peak associated with the fluctuations of order parameter (polarization). The anomalies of elastic modules (sound velocity) in the paraelectric phase also appear due to the presence of local polar inhomogeneities. However, the relationship between anomalies of the elastic moduli and local polar inhomogeneities in ferroelectric crystals and relaxors remains unstudied now.

In present work the temperature behavior of elastic modules in $Sr_xBa_{1-x}Nb_2O_6$ (SBN-*x*) crystals with chemical compositions $x$ = 0.33, 0.5, 0.61, 0.75, $BaTiO_3$ and PMN crystals were investigated by Brillouin light scattering using six-passed Fabry-Perot interferometer. The central peak was measured by Raman scattering using spectrometer TriVista 777. The temperature dependencies of position (elastic module) and FWHM of longitudinal acoustic mode (LA mode) and central peak were investigated in mentioned above samples. Acoustic anomalies of an elastic module in a wide temperature range were observed. Assuming the existence of local piezoelectric effect inside polar inhomogeneities a relaxation time $\tau$ fluctuations was determined. Obtained relaxation time was being compared with that of the central peak.

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